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Mapping methane point emissions with imaging spectroscopy satellite missions

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Imaging spectroscopy, also known as hyperspectral imaging, is a remote sensing technique in which images of the solar radiation reflected by the Earth are produced in hundreds of spectral channels between the visible and the shortwave infrared part of the electromagnetic spectrum (roughly 400–2500 nm). The 2100-2450 nm spectral window can be used for methane retrievals, as it has been demonstrated over the last years with airborne imaging spectrometers, and very recently also with space-based instruments. Satellite-based hyperspectral images are acquired with a typical spatial sampling for satellite data of 30 m, a spatial coverage between 30x30 and 60x60 km per scene, and a spectral sampling of 10 nm. In this work, we will present an overview of the state-of-the-art of methane mapping with imaging spectroscopy missions. We will review the characteristics of the available missions, the main retrieval approaches, and will present examples of methane emission detection from a number of missions and locations around the Earth.